General Notes.

MINERALOGY AND PETROGRAPHY. [1]

Petrographical News.—An interesting paper on the origin of the hornblende schists and granulites of the Lizard, by McMahon,[2] contains some new ideas with regards to these rocks. The author thinks that the banded hornblende schists were originally volcanic ashes, along the sedimentation planes of which water flowed, dissolving substances in some places and depositing them at others. The hornblende crystals in certain places attracted to themselves new hornblende material and thus produced a dark band. The banding of such schists is thus supposed to be due to segregation. Their composition is essentially hornblende, plagioclase, and malacotite. The granulites are plagioclase, mica, quartz rocks containing a few other unimportant constituents. They are markedly banded with dark and light bands, the great differences in the composition of which are accounted for on the supposition that the rocks were originally diorites cut by granite veins, and that afterwards they were changed as above outlined.——Another valuable paper upon a kindred subject is that by Callahan[3] upon the production of gneiss and schists by the shearing of eruptive rocks. The diorites of the Malvern Hills have undergone a structural change along shearing zones without changes in their mineralogical composition. The hornblende of these rocks is fractured. It breaks into little grains, and diminishes in quantity, until in the zone of greatest shearing it is entirely replaced by epidote, chlorite and biotite. The plagioclase also decreases as the schistisity becomes more marked, and gives rise to muscovite. At the same time secondary quartz and new feldspar are generated. In some instances the final stage of the alteration is a rock composed of quartz, some feldspar and a little biotite. The alteration of the biotite and chlorite into muscovite, the production of garnets and zoisite, probably from chlorite, the change of almenite into sphene, and the formation of actinolite, hematite and calcite are discussed, and the description of many thin sections of rocks are given. It is shown that infiltration occurs along the shearing zones, and takes part in the

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[2] *Quart. Jour. Geol. Soc.*, Aug., 1889, p. 519.

[3] *Quart. Jour. Geol. Soc.*, Aug., 1889, p. 475.

formation of the new minerals.——Johnston-Lavis [4] gives a description of an interesting trachyte from the Bay of Naples. It is of a light gray color, and consists of sanidine crystals, fractured and strained by pressure, hornblende, in broken, irregular, yellowish green grains, small masses of the same substances mixed with grains of pyroxene, and with these producing an apparent crystal of hornblende having an aggregate polarization, and a third variety of the same mineral in dark bluish green rods, also composed of an aggregation of grains. This last variety of hornblende, together with microlites of sanidine, make up the groundmass. The peculiarity of the rock is the great variety and beauty of the minerals implanted on the walls of the vesicles so abundant in it. These in the order of their age are: little crystals of sanidine, needles of amphibole, a crystallized manganese pyroxene, bunches of hair-like chocolate crystals that may be rutile or a titanium breislakite, pseudohexagonal, colorless, limpid crystals of sodalite, small hexagonal crystals of a mineral resembling microsommite, and orange scalenohedra of calcite.——Miss Raisin [5] gives an account of the perlitic and spherulitic felsites of the Lleyn in Wales. These are devitrified lava flows, containing concretionary nodules, and other forms produced by secretion. The larger spherulites are developed in certain layers. They appear to be the most durable portions of the rock, since the pressure that modified the matrix in which they lie has not affected them in the slightest degree. Some of the nodules are undoubtedly concretionary, and others are produced by the filling of vesicles. A few conclusions deduced from the facts observed relate to the mode of formation of spherulites and lithophysæ in rhyolites and andesites.——Hutchings [6] has discovered an ottrelite schist in Tintagel, North Cornwall. The rock is a hard, lustrous state, composed of sericite, ottrelite and ilmenite. The ottrelite is in small flakes, frequently intergrown with sericite. Its pleochroism is A=yellowish green, B=blue, C=greenish yellow, and it is filled with inclusions of rutile. This latter mineral is also abundantly scattered through the rest of the rock. An interesting association of ilmenite and rutile is mentioned, but the manner of their combination could not be determined.——McMahon [7] explains the polysynthetic structure of porphyritic quartz crystals in a felsite from near Delhi, India, by supposing the crystals to have formed at depths, and then to have been corroded by the magma after the rock reached

[4] *Geological Magazine*, Feb., 1889, p. 74.

[5] *Quart. Jour. Geol. Soc.*, May, 1890, p 247.

[6] *Geol. Magazine*, May, 1889, p. 214.

[7] *Micro. Magazine*, May, 1888, p 10.

the surface of the ground. Under these changed conditions the quartz became plastic, and was about to remelt when solidification resulted. Mr. Worth[8] uses the term Elvan to designate rocks that have been found by the cooling of a magma with the composition of granite under conditions intermediate between those that yielded plutonic rocks and those that gave rise to surface rocks. He calls attention to the many different structures possessed by these elvans even in the same dyke. ——Miss Raisin[9] declares that the greenstone-schists near Redlap, S. Devon, Eng., are crushed diabases, in which secondary changes have taken place. The article denies the correctness of certain conclusions with regard to the character of these rocks, as drawn by Mr. Somervail,[10] who thinks them chlorite schists.——Mr. Goodchild[11] does not believe that the paste of limestones is the result of the breaking down of shells. He ascribes it to chemical precipitation, due to the reaction of decomposing organic matter upon the sulphate of calcium so abundant in sea water. Berwerth[12] declares that the rock from Pizzo Lunghino described by himself and von Tellenberg as jade, is a granular aggregate of vesuvianite and sahlite, of which the latter is the younger.

Mineralogical News.—*Crystallographic.*—Traube[13] has discovered seventeen new forms in *cinnabar* from the barite veins cutting hornstones near Mt. Avala in Servia. Four of these are trigonal pyramids $\frac{1}{10}$ R2, $\frac{1}{8}$ R2, $\frac{7}{9}$ R2 and $\frac{5}{4}$ R2, and the others are rhombohedra—$\frac{1}{15}$ R, $\frac{1}{12}$ R, $\frac{1}{7}$ R, $\frac{1}{5}$ R $\frac{5}{14}$ R, $\frac{3}{10}$ R, $\frac{5}{9}$ R, $\frac{10}{19}$ R, $\frac{13}{9}$ R, $\frac{5}{3}$ R, $\frac{9}{5}$ R, $\frac{7}{2}$ R, and 16 R. The plane 6P2 which has been reported as occurring in the mineral, is found by more accurate measurements to be 4P2, so that up to this time 74 forms have been detected in cinnabar. The *calomel* that covers quartz and cinnabar crystals in this vein was also carefully examined by Traube.——On *tantalite* from Pisek, Bohemia, Urba[14] finds the new planes $6P_{\frac{6}{5}}$, $3P_{\frac{3}{2}}$, $\frac{3}{2}P\frac{3}{2}$, $P\frac{4}{3}$, $P_{\frac{1}{3}}$. Good crystals of the rare mineral *parisite* (Medici-Spada's *musite*) from New Granada afford an opportunity for more complete measurements of this mineral than have heretofore been possible. Its habit is short hexagonal or columnar, with an axial ratio $a:c=1:3.36\ 46$. Its specific gravity is 4.364.——In

[8] *Quart. Jour. Geol. Soc.*, Aug., 1889, p. 398.

[9] *Geol. Mag.*, June, 1889, p. 265.

[10] Devonshire Transactions for 1888, p. 215.

[11] *Geological Magazine*, Feb., 1890, p. 73.

[12] Ann. K. K. Naturhis. Hofmus. Wien, 1889, p. 87.

[13] *Zeits f. Kryst.*, XV., p. 563.

[14] *Zeits. f. Kryst.*, XV., p. 194.

an article on the *magnetite* of the alps Brugnatelle [15] describes crystals of this mineral from Traversella in Piedmont, Wildkreuzjoch in the Pfitschthal and Monte Mulatto and Scalotta in the Fassathal. The crystals are remarkable for their wealth of forms, of which $\frac{3}{2}O\frac{3}{2}$, $\frac{5}{3}O\frac{5}{3}$, $5O5$, $3O$, $\infty O5$, $\frac{5}{3}O\frac{5}{4}$ and $\frac{13}{9}O\frac{3}{11}$ are new to the species, and the last of these new to the system. The plane $3O\frac{3}{2}$ occurring with O and ∞O in crystals from Traversella is thought to have been developed by etching after the formation of the crystals. Natural etched figures on the ∞O faces of Rothenkopf crystals are described in detail.—— Tetrahedrally shaped crystals of *stronticenite*[16] from the phonolite of the Kaiserstuhl are hemimorphic in the direction of their *C* axes, and contain ∞P, $\infty P\breve{\infty}$ and $P\breve{\infty}$. When two or more of these hemimorphic crystals are twinned they produce forms resembling aragonite twins.—Complicated crystals of *fluorite*, with numerous vicinal planes, are mentioned by Hintze[17] as associated with the scheelite from Kiessberge in the Riesengrund, Germany.——*General.*—In his notes on some minerals from the Lizard, Eng., Mr. Teall[18] describes briefly some interesting ones. A chrome *diopside* forms with labradorite and olivine a rock mass at Coverak, Cornwall. The diopside has a green color when viewed microscopically, but is colorless in thin section. It has a diallagic parting, an extinction of 40°, and a specific gravity of 3.2. Analysis of this, of a pale *hornblende* from a gabbro-schist at Pen Voose, and of *malacolite* from the gabbro of Karakelews are given.

	SiO_2	Al_2O_3	Fe_2O_3	Cr_2O_3	FeO	MnO	CaO	MgO	Ign.
Chromic diopside	49.9	6.2	1.7	.6	3.9	.4	20.4	16.1	.9
Hornblende	48.8	10.6	1.7	tr	4.7		12.2	18.6	1.8
Malacolite	52.8	2.8	1.8				25.2	16.6	.5

Anthophyllite, from a reaction rim between olivine and feldspar at the contact of gabbro and serpentine, was separated, and its composition was found to be:

SiO_2	Al_2O_3	Cr_2O_3	Fe_2O_3	FeO	CaO	MgO	Na_2O	K_2O	Ign
50.8	3.6	tr	2.7	6.8	1.2	26.1	.2		5.8

A new find of *corundum*, associated with andalusite, cyanite, chloritoid and mica, is reported by Genth [19] from near Stuart, Patrick Co., Va. The rock in which the minerals occur appears to be a garnetifer-

[15] *Zeits. f. Kryst.*, XIV., p. 237.

[16] Becken kamp. *Zeits. f. Kryst.*, XIV., p. 67.

[17] *Zeits. f. Kryst.*, XIV., p. 74.

[18] *Min. Magazine*, Oct., 1888, p. 116.

[19] *Min. Magazine*, Oct., 1888, p. 116.

ous and staurolitic gneiss. The andalusite is often an alterative product of the corundum. Cyanite, rhætzite and margarite pseudomorphs of *andalusite* are quite common in the rock.—Von Eterlein [20] describes a new occurrence of calcite in the Floitenthal, Tyrol. The crystals are implanted in a granitic muscovite gneiss. Those containing the basal plane have this face marked by three systems of striations, running parallel to the three edges oR, Λ, R. They are thought to be due to etching. A bed of *sulphur* in the volcanic island Saba in the W. Indies contains crystals of this substance, very rich in crystal planes. Twenty-three forms have been detected upon them by Molengraff, [21] and of these four are new, viz. $3P\breve{\infty}$, 2P, 3P and $P\breve{3}$. Two crystals of *neochrysolite* from the 1631 lava stream of Vesuvius, the one with a tabular habit, and the other columnar, have been carefully measured by Scacchi, [22] who regards the mineral as very similar in all its properties to fayalite.—Analyses of *dufrenite* [23] from Cornwall correspond to the formula $3Fe_2O_3.FeO.2P_2O_5.6H_2O$, and not to $2Fe_2O_3$, P_2O_5, $3H_2O$ as is usually supposed. *Warrenite* [24] is the name proposed for the sulph-antimonate described by Eakins some time ago.

Miscellaneous.—Hutchings [25] records the discovery of a little crystal of *willemite* in a slag obtained during the fusion of lead dross. The slag contains 1½ per cent. of lead, and from 12–15 per cent. of ZnO, and it consists of fayalite, zinc, spinel and magnetite, with but a trace of amorphous base. A second run of the same furnace yielded no willemite. The slag in this case contained 5 per cent. of lead, and was in large part glassy, and in it were idiomorphic crystals of fayalite. The observations are interesting, also showing the effects produced in the structure of the cooled magma by the slight differences in the percentage of lead. Crystals of *cuprite* and *cerussite* are described by Fletcher [26] as resulting from the slow alteration of old Roman coins buried at Chester, England. The crystals line the cavities between adjacent coins, and are supposed to be due to the action of circulating alkaline waters on the metals in them.

[20] *Zeits. für Kryst.*, XIV., p. 280.

[21] *Zeits. für Kryst.*, XIV., p. 43.

[22] *Zeits. für Kryst.*, XIV., p. 293.

[23] Kinch: *Miner. Magazine*, Oct., 1888, p. 112.

[24] *Amer. Jour. Sci.*, Jan., 1890. p. 75.

[25] *Geol. Mag.*, Jan., 1890. p. 31.

[26] *Miner. Magazine*, Dec., 1887. p. 87.